

CLAIMS:

1. A cutting tool for metal cutting operations comprising a tool body having at least one cutting portion, the at least one cutting portion comprising:

a cartridge pocket having a retaining portion;

5 a cartridge comprising a clamping portion and an insert bearing portion having an insert pocket with a detachable cutting insert retained therein,

the clamping portion being resiliently transformable between a normally non-expanded state and a biased expanded state, wherein

10 the clamping portion is slidably insertable into the cartridge pocket retaining portion when in the normally non-expanded state, and is securely retained in the cartridge pocket retaining portion when in the biased expanded state and the insert pocket and the cutting insert are located external to the cartridge pocket retaining portion.

15 2. The cutting tool according to claim 1, wherein the cartridge pocket comprises a cutout in the tool body having a generally concave inner surface bounded by two substantially equally shaped opposing side openings formed in the tool body, the cartridge pocket opening out to a circumferential side surface of the tool body; the inner surface comprising opposing upper and lower surfaces extending from a rear surface to the circumferential side surface.

20 3. The cutting tool according to claim 2, wherein the cartridge is slidably insertable into the cartridge pocket through one of the side openings along an axis of lateral displacement of the cartridge pocket.

4. The cutting tool according to claim 3, wherein the axis of lateral displacement is parallel to the inner surface of the cartridge pocket.

5. The cutting tool according to claim 2, wherein:

a portion of the upper surface comprises an upper support surface inclined relative to a line perpendicular to the rear surface of the cartridge pocket, and

the lower surface comprises two lower support surfaces: a primary forward support surface adjacent the circumferential side surface, and a primary rear support surface adjacent the rear surface, the primary forward and rear support surfaces being inclined relative to the line.

6. The cutting tool according to claim 5, wherein the primary forward and rear support surfaces are separated by a central depressed surface.

7. The cutting tool according to claim 6, wherein the lower surface further comprises at least two secondary support surfaces, a secondary forward support surface located between the primary forward support surface and the circumferential side surface and a secondary rear support surface located between the primary rear support surface and the central depressed surface, the secondary forward and rear support surfaces being inclined relative to the line.

8. The cutting tool according to claim 2, wherein the cartridge further comprises:

a top surface, a bottom surface, and a peripheral side surface extending therebetween, the peripheral side surface comprising back and front opposing surfaces and two parallel side surfaces extending between the back and front surfaces;

a slit traversing the clamping portion between the side surfaces and opening out to the back surface, thereby dividing the clamping portion into an upper clamping jaw resiliently connected to a lower base jaw; and

a through bore located partially in the slit and traversing the clamping portion.

9. The cutting tool according to claim 8, wherein the through bore has a cylindrical central region with two end regions:

a first end region opening outwardly to one side surface, and

a second end region opening outwardly to the opposing side surface.

10. The cutting tool according to claim 9, wherein each end region of the through bore is slightly oval in shape in a side view of the cartridge and is defined by two diameters: a major diameter parallel to the slit, and a minor diameter perpendicular to the slit, where the major diameter is greater than the minor diameter.

11. The cutting tool according to claim 9, wherein the clamping portion is transformable from the normally non-expanded state to the biased state by tightening a clamping screw wholly contained in the through bore.

12. The cutting tool according to claim 11, wherein:

the clamping screw has a conical head and a threaded free end; and

a nut with a knurled conical surface is screwed onto the free end so that the conical head of the clamping screw is located in the first end region of the two end regions of the through bore and the nut is located in the second end region.

13. The cutting tool according to claim 8, wherein:

a portion of the upper surface comprises an upper support surface inclined relative to a line perpendicular to the rear surface of the cartridge pocket, and

the lower surface comprises two lower support surfaces: a primary forward support surface adjacent the circumferential side surface, and a primary rear support surface adjacent the rear surface, the primary forward and rear support surfaces being inclined relative to the line.

14. The cutting tool according to claim 13, wherein:

a forward portion of the top surface of the clamping jaw constitutes a top abutment surface for abutting the upper support surface of the cartridge pocket; and

the bottom surface of the cartridge is provided with a primary forward abutment surface and a primary rear abutment surface, corresponding to, and for engagement with, the two lower support surfaces of the lower surface of the cartridge pocket; wherein

5 the top abutment surface and the primary forward and rear abutment surfaces are inclined in a matching fashion to the upper support surface and lower support surfaces, respectively.

15. The cutting tool according to claim 14, wherein the primary forward and rear abutment surfaces are separated by a central relieved portion of the bottom surface.

16. The cutting tool according to claim 15, wherein the bottom surface further comprises two secondary abutment surfaces:

10 a secondary forward abutment surface located between the primary forward abutment surface and the front surface; and

a secondary rear abutment surface located between the primary rear abutment surface and the central relieved portion.

15 17. The cutting tool according to claim 16, wherein the top abutment surface and primary forward and rear abutment surfaces are inclined in a matching fashion to the upper support surface and lower support surfaces, respectively.

20 18. The cutting tool according to claim 17, wherein with the cartridge securely retained in the cartridge pocket, the back surface of the cartridge abuts the rear surface of the cartridge pocket, a top abutment surface of the cartridge abuts an upper support surface of the cartridge pocket and at least two abutment surfaces of the bottom surface of the cartridge abut a corresponding at least two support surfaces of the lower surface of the cartridge pocket.

19. A cartridge for securing in a cartridge pocket of a cutting tool for metal cutting operations comprising:

a clamping portion and an insert bearing portion having an insert pocket with a detachable cutting insert retained therein,

the clamping portion being resiliently transformable between a normally non-expanded state and a biased expanded state, wherein

5 the clamping portion is slidably insertable into the cartridge pocket when in the normally non-expanded state, and being securely retained in the cartridge pocket when in the biased expanded state with the insert pocket and the cutting insert located external to the cartridge pocket.

20. The cartridge according to claim 19, comprising:

10 a top surface, a bottom surface and a peripheral side surface extending therebetween, the peripheral side surface comprising back and front opposing surfaces and two parallel side surfaces extending between the back and front surfaces;

a slit traversing the clamping portion between the side surfaces and opening out to the back surface, the slit dividing the clamping portion into an upper clamping jaw resiliently connected to a lower base jaw; and

15 a through bore located partially in the slit traverses the clamping portion.

21. The cartridge according to claim 20, wherein the through bore has a cylindrical central region with two end regions:

a first end region opening outwardly to one side surface; and

a second end region opening outwardly to the opposing side surface.

20 22. The cartridge according to claim 21, wherein each end region of the through bore is slightly oval in shape in a side view of the cartridge and is defined by two diameters: a major diameter parallel to the slit and a minor diameter perpendicular to the slit, where the major diameter is greater than the minor diameter.

23. The cartridge according to claim 22, wherein:

a forward portion of the top surface of the clamping jaw constitutes a top abutment surface;
and

the bottom surface of the cartridge is provided with a primary forward abutment surface
5 and a primary rear abutment surface; wherein

the top abutment surface and the primary forward and rear abutment surfaces are inclined
to a line perpendicular to the back surface of the cartridge.

24. The cartridge according to claim 23, wherein the primary forward and rear abutment
surfaces are separated by a central relieved portion of the bottom surface.

10 25. The cartridge according to claim 24, wherein the bottom surface further comprises two
secondary abutment surfaces:

a secondary forward abutment surface located between the primary forward abutment
surface and the front surface; and

a secondary rear abutment surface located between the primary rear abutment surface and
15 the central relieved portion.